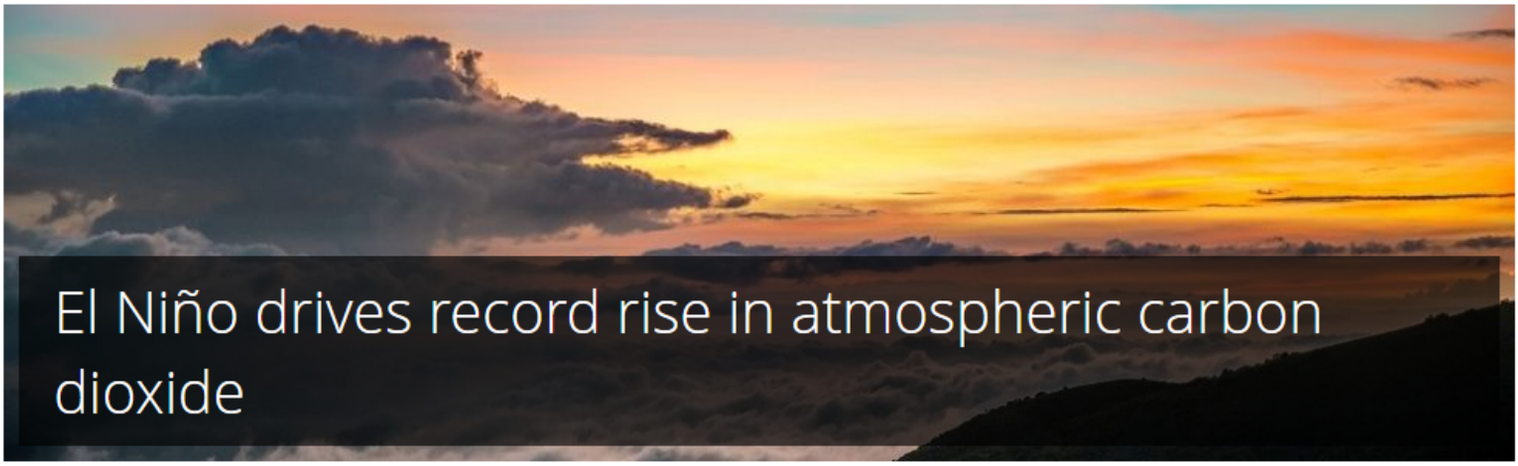

El Niño drives record rise in atmospheric carbon dioxide

13 June 2016 - The rising concentration of atmospheric carbon dioxide has passed a symbolic threshold early due to the fastest annual increase on record

The human-caused rise in the atmospheric concentration of carbon dioxide is being given an extra boost this year by the natural climate phenomena of El Niño say climate scientists in a paper published in today's edition of the journal: Nature Climate Change . As a result, 2016 will be the first year with concentrations above 400 parts per million (ppm) all year round in the iconic Mauna Loa carbon dioxide record.

Prof Richard Betts, of the Met Office Hadley Centre and University of Exeter, is the lead author on the paper. He said: "The atmospheric carbon dioxide concentration is rising year-on-year due to human emissions, but this year it is getting an extra boost due to the recent El Niño event. This warms and dries tropical ecosystems, reducing their uptake of carbon, and exacerbating forest fires. Since human emissions are now 25% greater than in the last big El Niño in 1997/98, this all adds up to a record CO2 rise this year."

The rising trend in CO2 was seen by Charles David Keeling when he began recording CO2 at Mauna Loa, Hawaii, in 1958. His early measurements were around 315ppm of carbon dioxide. Sixty years later this has been rising at an average rate of 2.1ppm, but using a seasonal climate forecast model and statistical relationship with sea temperatures, Prof Betts and colleagues forecast the rise this year to be a record 3.15 +- 0.53 ppm. The average concentration in 2016 is forecast to be 404.45 +-0.53 ppm, dropping to 401.48 +- 0.53 in September before resuming their ongoing rise next year. The scientists already successfully predicted this year's maximum concentration of 407 ppm last month

Carbon dioxide concentrations also show modest ups-and-downs with the seasons. Plants draw down CO2 in the summer and release it again in the autumn and winter. Prof Betts added: "Carbon dioxide at Mauna Loa is currently above 400 parts per million, but would have been expected to drop back down below this level in September. "However, we predict that this will not happen now, because the recent El Niño has warmed and dried tropical ecosystems and driven forest fires, adding to the CO2 rise".

Since natural processes only remove carbon dioxide from the atmosphere gradually, levels will remain high even if anthropogenic emissions began to decline. Scientists expect the concentrations to now remain above 400 ppm for at least a human lifetime.

Prof Ralph Keeling of the Scripps Institution of Oceanography , who is a co-author on the paper, said: "Back in September last year, we suspected that we were measuring CO2 concentrations below 400 ppm for the last time. Now it is looking like this was indeed the case." The ongoing CO2 measurements at Mauna Loa used in this study are made by the Scripps Institution of Oceanography, and an independent set of measurements are made by the US National Oceanographic and Atmospheric Administration , which runs the Mauna Loa Observatory.

Chris Jones, also of the Met Office Hadley Centre and another co-author, said: "Studying how these natural cycles interact with human influences is an important part of climate science. Making and testing predictions like this helps us build our understanding and further develop climate models."

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